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COLORADO DEPARTMENT OF HEALTH

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To RI 12-2-88

29 November 1988

Rocky Flats Area Office
U.S. Department of Energy
P.O. Box 928
Golden, Colorado 80402

Attn: Mr. Albert E. Whiteman, DOE Area Manager
Mr. Dominic J. Sanchini, President & General Manager, Rockwell International

Re: EPA I.D. No. CO7890010526
Solar Evaporation Closure Plan Comments

Dear Messrs. Whiteman and Sanchini:

The Hazardous Materials & Waste Management Division of the Colorado Department of Health ("the Department") has reviewed the Solar Evaporation Ponds closure plan of July 1, 1988.

The Department has some questions on various aspects of the closure plan, as defined in the attached comments. The Department feels that these questions and comments can best be addressed in a meeting with you or your staff. Please contact George Dancik at 331-4842 to arrange a meeting date.

Sincerely,

Gary W. Baughman

Gary W. Baughman, Unit Leader
Hazardous Facilities Unit
Hazardous Materials & Waste Management Division

- Jan 10th
1:30
Rm 250
CDH

cc: Nat Miullo, EPA
Martin Hestmark, EPA
Jefferson County Health Dept.
Boulder County Health Dept.

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Attachments

GWB:GD/cal
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Solar Evaporation Ponds Closure Plan Comments

1) According to Section 1.2.1, extensive modifications and renovations were performed on the Solar Ponds during the 1960's and 1970's. These renovations included both liner repair and replacement. Explain where the liquids, sludges and old liner materials were disposed of when various ponds, such as Pond 207-B South and Center, were relined.

2) The maximum operating volume for Pond 207-A is given as approximately 5.1 million gallons. Calculations for this value are referred to in Appendix 2. However, the table of volume calculations shown in Appendix 2 indicates a maximum volume for Pond 207-A of approximately 5.7 million gallons. Similarly, the operating volume of Pond 207-C is estimated at 1.3 million gallons, while Appendix 2 shows a calculated volume of 1.2 million gallons. Explain the discrepancies.

3) Section 1.3.2.2 states that "Plutonium-239 and Americium-241 were not identified in the Pond 207-B North liquid in April and May, 1986." However, the analytical report for Pond 207-B North, dated August 27, 1985 and found in Appendix 3, indicates Pu-239 levels of 71.2 pCi/l and Am-241 levels of 57.6 pCi/l. Likewise, the analysis dated June 5, 1984 shows Pu-239 levels of 30 pCi/l and Am-241 levels of 97 pCi/l for Pond 207-B North. Explain the large variation in these radionuclide levels over the relatively short time period from June, 1984 to April, 1986.

Page 32 indicates that Ponds 207-B North and Center "have generally low concentrations of nitrates, metals and radionuclides". The nitrate concentration average of 380 mg/l and the gross alpha average of 104 pCi/l are lower than Pond 207-A, but are still elevated in comparison to the Colorado drinking water standard for nitrate (10 mg/l) and the Colorado screening level of 15 pCi/l for gross alpha in water. Explain how these values can be considered "low".

4) According to page 48, "Compliance with the Resource Conservation and Recovery Act (RCRA), with respect to solar pond closure, will be achieved by meeting 6 CCR 1007-3, Section 265.228 and Section 264 Subpart F." Compliance with Section 265, Subpart G and Section 264 is also required for solar pond closure in place as a landfill. Similarly, Section 4.1, page 115 also requires compliance with these regulations.

5) The Summary of Solar Pond Closure Activities, presented in Figure 10 on page 49, is based on the resumption of pond-creting activities by the end of July, 1988. Page 50 states that schedules will be revised within 30 days if problems are identified and the schedule cannot be met. The current pond-crete status must be indicated, and the schedule updated to reflect the delays in the pond-creting operations. Other schedules throughout the closure plan, must also be updated based on the revised pond-creting schedule.

6) What is the "non-toxic, non-radioactive dye", referred to in Section 2.2.6, which must be added to the solar ponds "to increase heat gain and thereby increase solar evaporation"? Explain the circumstances and conditions under which this dye may be used. The Material Safety Data Sheet (MSDS) for this dye should be included in the appendices to this closure plan.

7) Sections 2.4.3.2 and 4.6 describe potential "sudden increases in airborne contamination due to excavation in localized highly contaminated areas". The health and safety plan must specifically address the prevention and reduction of air release of contaminated dust. Work cessation measures in anticipation of natural dissipation are not adequate protection for human health and the environment. The work plan for the site must be directed towards the prevention of, not the control of a release, and will require the use of dust suppressants such as wetting agents during excavation. These agents will be specified before use.

8) Sections 2.6.1, 2.6.1.2 and 2.6.1.3 indicate that the removal of pond liners and underlying soils are dependent on combined plutonium and americium activity. The decision level for removal is set at 20 pCi/gm for combined activity. This level is approximately 22 times the construction standard for plutonium in soil as established by the Colorado Department of Health (CDH)(0.9pCi/gm). The CDH standard of 0.9 pCi/gm must be used as the decision level, and the "as low as resonably achievable" or ALARA philosophy for surface radioactive contamination levels must be applied.

State your rationale in basing the soil and liner removal decision exclusively on plutonium and americium. Other solar pond contaminants such as strontium, cadmium, organics, etc. may be present at levels far above the Maximum Contaminant Level (MCL), thus predicating soil and/or liner removal.

9) Section 2.6.1.3 indicates that the lateral and vertical extent of soil contamination requiring capping have been evaluated and are discussed in Appendix 6. The contours or isopleths for constituents of concern in the solar pond area must be presented so as to rapidly identify the lateral and vertical extend of contamination. Approval of removal activities will be based on this information as it is gathered. Currently, isopleths based on the northeast trending nitrate "plume" which envelopes "all intermediate boreholes except SP 13-87" appear to best represent the extent of soil contamination.

10) Appendix 6 (page 5-33) indicates that "it is likely that contamination at Well 17-86 has arisen from the solar ponds because of the inability of the French drain to capture all contaminated ground water exiting the solar ponds during periods of high precipitation". Data for Well 17-86 indicate that the nitrate level ranges from 145 to 540 mg/l, and the total dissolved solids (TDS) level exceeds 4000 mg/l. Both of these values exceed drinking water standards. Well 17-86 is down-gradient (north) of the French drain system. Explain how the existing French drain system and the proposed interceptor drain will prevent the further migration of constituents from the solar ponds. How deep will the "toed-in" interceptor drain be constructed?

11) Section 4.3.3 specifies a 24-inch compacted on-site soil layer located above the 6 inch horizontal sand layer. The 24-inch soil layer must be placed in four 6-inch lifts to achieve optimal design performance. Previous to the placement of the compacted soil layers, the underlying sand layer must be compacted in order to minimize soil infiltration into the sand layer. Equipment and procedures used in compaction of the various layers must be specified. Section 4.3.8 discusses fill placement

and differential settlement within the solar ponds. The expected 10 feet of fill in this area must be limited to 1-foot lifts in order to ensure that the potential for differential settlement is minimized.

12) Explain how the topsoil surface of the landfill cap will be protected from erosion prior to the establishment of vegetation on the cap (page 130). Page 119 indicates that the "total cover area is approximately 670,000 square feet". This extent is based on the site characterization. Page 137, however, indcates that "the area requiring vegetation will consist of the 750,000 square feet cover". Are the cover material volume calculations on page 129 based on the correct surface area estimate?

13) The ground-water monitoring requirements for closure (Section 265) and post-closure (Section 264) must be evaluated and compared to the existing ground-water monitoring system at the solar ponds. The proposed ground-water monitoring plan must adequately address the comments and deficiencies noted by CDH in the Ground-Water Monitoring of Interim Status Units Letter, issued to the facility on July 19, 1988.

14) The specific activities to be monitored and documented as complete by the independent Colorado-Registered Professional Engineer will be explicitly stated in the closure plan. CDH must be notified prior to these specific activities in order for a state inspector to also be present.

15) Additional monitoring wells are needed to adequately delineate the extent of the subcropping sandstone, and the contamination plume within them. Besides the additional monitoring wells proposed by RFP in Appendix 6, the following wells are necessary:

A. A bedrock monitoring well located just south of borehole SP05-87. This well will monitor the ground water down-gradient from pond 207-C in the subcropping sandstone. This location will also aid in establishing the extent of contaminant migration in the area.

B. A bedrock monitoring well located approximately 250 feet east of well 39-87. This well is to be completed in the sandstone subcropping at well 39-87, and will monitor the down-gradient migration of contamination emanating from the 207-B ponds.

C. A bedrock monitoring well located in conjunction with the proposed new RFP alluvial well between pond 207-B center and existing alluvial well 29-86. This well will further characterize bedrock hydrogeology in the area to the east of the solar ponds, and also aid in establishing the extent of the easterly component of contamination extending from the 207-B ponds.

D. A bedrock and alluvial well pair located approximately 220 feet due north of well 30-86 and within the northeast-trending paleochannel.

E. A bedrock and alluvial well pair located approximately 200 feet due north of borehole SP10-87 within the north-trending paleochannel. This well and well #4 above are sited in order to better define the potential extent of contamination within the paleochannels.

Updated cross-sections based on the information obtained from these wells must also be provided to CDH.

16) Section 4.2.1 of Appendix 6 indicates that background soil levels are derived from samples obtained from the top one foot of soil west of the West Spray Field. However, subsurface and bedrock soils more than likely have a very different background composition than the surficial alluvial soils of the West Spray Field. Explain the validity of the contamination screening comparison for "background" surface soils vs subsurface soils and bedrock. State your rationale for attributing a "variability factor" of three to naturally occurring metal levels, particularly chromium and nickel, in the solar pond area.

17) Chromium was found in boreholes SP05-87, SP07-87, SP11-87 and SP15-87 at levels significantly above the three times background standards arbitrarily selected by RFP. Chromium levels in boreholes SP06-87 and SP12-87 were also above the RFP standard, and nickel levels for boreholes SP05-87, SP07-87, SP11,87 and SP15-87 were also significantly elevated. These elevated nickel and chromium levels were generally associated with other elevated metals such as copper and zinc. Explain the elevated findings at borehole SP11-87 and the elevated concentration at deeper levels of SP05-87 and SP07-87 (approximately 9-23 feet). The analytical results from SP05-87, SP06-87 and SP07-87 are associated with the solar ponds, and SP12-87 and SP15-87 are down-gradient from the solar ponds. Explain how these analytical results justify the elimination of chromium and nickel from closure performance standards.

The further analysis of Interceptor Trench Pump House (ITPH) ground water and the ground water collected from bedrock wells placed in 1987 must be considered in conjunction with soil data, and presented prior to eliminating chromium and nickel from consideration.

18) According to Appendix 6, page 4-26, "strontium is not considered a contaminant of soils in the solar pond area". Before strontium is dismissed as a potential contaminant, strontium levels must be re-evaluated after further data have been collected and the background level for strontium in soils at the RFP has been established. Comparing the analytical data for strontium in soils with the average of all the samples analyzed and presented in Appendix C-1 reveals that boreholes SP02-87, SP04-87 and SP06-87 apparently contain soils which are considerably higher in stronium concentrations than the average value for all samples in Appendix C-1 (approximately 57 mg/kg). The levels found in the soil samples of these boreholes appear to be associated with the solar ponds and must be explained. To rely solely on cited references for average soil strontium levels is not acceptable, especially given the historical presence of strontium within the solar pond liquids.

19) Appendix 6, page 4-29 again defines "20 pCi/gm of transuranics as the limit above which soil removal is necessary". This statement is similar to Sections 2.6.1, 2.6.1.2 and 2.6.1.3 of the closure plan text. The soil standard as defined by the State of Colorado for plutonium is 0.9 pCi/gm. This value is considerably lower than the proposed removal standard of 20 pCi/gm above which soil removal at the solar ponds would be required. The analyses for boreholes SP01-87, SP04-87, SP05-87, SP07-87, SP10-87 and SP16-87 all contain transuranic activity levels above the CDH standard.

standard is [illegible]ually ALARA-based, a significan[illegible]crease in predicted soil removal volume may be required.

Page 4-27 indicates that all measured uranium concentrations were "within a factor of three of the upper background concentrations". This "factor of three" is irrelevant in indicating the presence of contamination, and in triggering removal decisions, because background levels have not been accurately established.

20) Although the soils data presented in Appendix 6, Table 4-9 for potential organic contamination are difficult to interpret due to sample mishandling and the lack of laboratory blanks, the compounds found at low concentration within the soil samples were also found in the ground water. Well 22-86 has been indicative of high levels of VOC contamination, and the contaminants found in the ground water from well 22-86 are also found in soils associated with the solar ponds. Explain how the exceedance of sample holding times, the failure to analyze lab blanks for the 1987 borings and the complete absence of analyses from boreholes SP03-87, SP05-87, SP07-87, SP12-87, SP13-87, SP14-87, SP15-87 and SP16-87 allow for the conclusion that "organic contamination, although possible, is not of major significance at the solar ponds".

The HNU and OVA readings on some 1987 cores are elevated, indicating the potential presence of organics in the down-gradient soils. Preliminarily, an organic source appears to be present near well 22-86. This source may be related to the location of the original solar ponds which were removed in 1970. Although the extent of soil contamination is not presently discernible from the existing data, the mishandling of the soil samples from the 1987 borings requires that further analysis of the soils be conducted before organic contamination in the solar pond vicinity is dismissed.

21) According to Appendix 6, Section 5.2.1.3, horizontal ground-water flow velocity for the North Walnut Creek valley fill alluvium is estimated at 1.5 ft./yr., based on a hydraulic conductivity of 4.6 ft./yr. However, the velocity values estimated by Hurr (1976) range from 2,500 to 6,500 ft./yr. Hydraulic conductivity values ranging from $4X10^{-8}$ cm/sec (.04 ft./yr.) to $8.7X10^{-6}$ cm/sec (9 ft./yr.) are unrealistic given the lithologies shown in Table 5.1 and the measured hydraulic conductivity values at other plant locations. More accurate and more extensive characterization of hydraulic conductivity must be performed in the solar pond vicinity. If the original solar pond was placed in service in 1956, and ground water moves at 1.5 ft./yr., explain the high nitrate levels present in the soil at boreholes SP12-87 and SP14-87. These boreholes are approximately 700 ft. down-gradient from the solar ponds Other constituents are also elevated in various boreholes, such as U233 and U238 levels in boreholes SP12-87, SP13-87 and SP15-87. Since the contamination in alluvial well 12-86 is likely associated with the solar ponds, the discrepancy between Hurr's estimate and the RFP velocity value of 1.5 ft./yr. must be explained.

22) Section 5.2.1.5, page 5-34, states that "the down-gradient extent of this "plume" is unknown but within plant boundaries, as well 4-86, located at Indiana Street, has always been dry." Because the alluvial system is most

Creek, contaminants may leave the plant site as surface flow. Therefore, the statement that the "plume" extent lies within plant boundaries must be justified. A dry well does not monitor ground water.

23) Well 30-86 has been impacted by contamination originating from the solar ponds and is located approximately 150 feet from the nearest up-gradient solar pond. Section 5.2.2.3, page 5-40, indicates that the calculated ground-water flow velocity for sandstone, siltstone and claystone is 0.3, 0.3, and 0.4 ft./yr. respectively. If the solar ponds had been in use since 1956, ground water could have flowed at most approximately 13 feet. Explain the discrepancy. Plume extent must be delineated by actual well placement and ground-water characterization as opposed to the use of estimates of plume extent.

24) Section 5.2.2.4, page 5-51 states that "the deep bedrock sandstone ground water is not impacted by the solar ponds or other possible up-gradient SWMUs." However, bedrock well 3-86 (total depth of 16 ft.) is dramatically impacted by contamination (radionuclides, metals and inorganics) originating from the solar ponds. The occurence of elevated levels of these same constituents cannot be dismissed as natural variability, but must be considered as emanating from the up-gradient solar ponds. Further investigation is required to fully characterize the nature and extent of contamination within the deep sandstone.

25) Surface water samples from North Walnut Creek must be taken monthly to evaluate the high flow and low flow conditions and the corresponding constituent concentrations. The inter-connection between the alluvial system and the North Walnut Creek surface water system would be most pronounced and documentable during the wet seasons when flow is highest.

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